

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A multilayered gas sensing element for incorporation into a gas sensor installed in an exhaust system of an internal combustion engine, the multilayered gas sensing element comprising:

laminated layers comprising at least one solid electrolytic sheet containing zirconia and yttria and at least one insulating sheet containing alumina, the insulating sheet having a reference gas chamber defined therein into which a reference gas is introduced, the reference gas chamber being bounded by the solid electrolytic sheet and the at least one insulating sheet;

a crystal phase containing silicon dioxide which intervenes between said solid electrolytic sheet and said insulating sheet at least at a part of a bonding boundary between said solid electrolytic sheet and said insulating sheet; and

a heater directly attached to a side surface of said insulating sheet to transfer heat generated in said heater to said insulating sheet and said solid electrolytic sheet,

wherein said solid electrolytic sheet and said insulating sheet having said heater are laminated and sintered such that the crystal phase is liquefied during the sintering so as to generate material transfer between said sheets via the liquefied crystal phase and such that the material transfer causes said sheets to be integrally bonded with each other, whereby the reference gas chamber is airtightly bounded by said integrally bonded electrolytic sheet and insulating sheet.

2. (Previously Presented) A multilayered gas sensing element as in claim 1, wherein said crystal phase further contains at least one component selected from the group consisting of: calcium oxide, magnesium oxide, barium oxide, and strontium oxide.

3. (Previously Presented) A multilayered gas sensing element as in claim 1, wherein said bonding boundary between said solid electrolytic sheet and said insulating sheet is undulated.

4. (Previously Presented) A multilayered gas sensing element as in claim 1, wherein said solid electrolytic sheet and said insulating sheet are directly bonded to each other at a remaining part of the bonding boundary, so that a crystal lattice of said solid electrolytic sheet is directly connected to a crystal lattice of said insulating sheet at the remaining part of said bonding boundary.

5. (Previously Presented) A multilayered gas sensing element as in claim 1, wherein a thermal expansion coefficient difference between said solid electrolytic sheet and said insulating sheet is equal to or less than 2×10^{-6} .

6. (Previously Presented) A multilayered gas sensing element as in claim 1, wherein a sintering contraction coefficient difference between said solid electrolytic sheet and said insulating sheet is equal to or less than 3%.

Claims 7-13. (Canceled).

14. (Previously Presented) The multilayered gas sensing element in accordance with claim 4, wherein a specific face of said crystal lattice of said solid electrolytic sheet specified by a Miller index of (2 1 1 0) is directly connected to a specific face of the crystal lattice of said insulating sheet specified by a Miller index of (1 0 0).

Claim 15. (Canceled).

16. (New) The multilayered gas sensing element in accordance with claim 1, further comprising:

a first electrode provided on a first surface of the solid electrolytic sheet so as to be exposed to a measured gas; and

a second electrode provided on a second surface of the solid electrolytic sheet so as to be exposed to the reference gas in the reference gas chamber.

17. (New) The multilayered gas sensing element in accordance with claim 1, wherein the heater comprises a heat generating element embedded between a pair of insulating sheets, one of said insulating sheets bounding said reference gas chamber.

18. (New) The multilayered gas sensing element in accordance with claim 1, wherein the insulating sheet is formed from an alumina-series green sheet containing SiO₂.

19. (New) The multilayered gas sensing element in accordance with claim 18, wherein the SiO₂ contained in the alumina-series green sheet is between 0.05 and 10 in weight part when the alumina and material is 100 in weight part.

20. (New) The multilayered gas sensing element in accordance with claim 1, wherein the solid electrolytic sheet is formed from a zirconia-series green sheet containing SiO₂.

21. (New) The multilayered gas sensing element in accordance with claim 20, wherein the SiO₂ contained in the zirconia-series green sheet is between 0.05 and 4 in weight part when zirconia material is 100 in weight.

22. (New) The multilayered gas sensing element in accordance with claim 1, wherein the solid electrolytic sheet is formed from a zirconia-series green sheet containing SiO₂ and the insulating sheet is formed from an alumina-series green sheet containing SiO₂.

23. (New) The multilayered gas sensing element in accordance with claim 1, wherein the zirconia-series green sheet contains SiO₂ and Al₂O₃, the SiO₂ is 0.05 to 4 in weight part and the Al₂O₃ is 0.5 to 4 in weight part when zirconia material is 100 in weight part, with a sum of SiO₂ and Al₂O₃ being not larger than 4 in weight part.